REPPERGER RESEARCH INTERN PROGRAM

RESEARCH PROJECT #: AFRL-RHB-23-04

Assessing the Role of the Microbiome in Warfighter Performance

PROJECT DESCRIPTION: The gut microbiome is the collection of microorganisms (mostly Bacteria, but also Archaea, fungi and viruses) that are the normal constituents of the human gastrointestinal tract. These microbial cells reach levels of billions per milliliter in the large intestine. Each person carries their own personalized mix of different microbes that have been acquired over a lifetime and whose diversity was built up from birth via exposure to family members, food, and other environmental exposures. Collectively, these microbes outnumber the body's own cells, and encode 300 times more genes than the human genome. These microbes interact closely with the host immune system, and perform critical services for the human host, such as enhanced degradation of dietary components, production of vitamins, degradation of xenobiotics, and protection from pathogen invasion. In this project we will characterize the Warfighter fecal microbiome to identify its association with host performance metrics. As such, we are looking for a student that has a strong background in microbial ecology and in the analysis of large data sets.

ACADEMIC LEVEL: Bachelor's, Master's, PhD

DISCIPLINE NEEDED:

- Microbiology
- Population and Community Ecology
- Data Science

RESEARCH LOCATION: Wright-Patterson Air Force Base, Dayton, Ohio

RESEARCH MENTOR: Michael Goodson, PhD
Host Microbe Symbioses, University of York, UK, 2000

I am a molecular biologist and microbial ecologist with 22 years post-doctoral experience, the most recent 14 years of which have been working on AFRL projects. My areas of expertise involve analyzing and manipulating microbes, their communities, and their genetic structure. This involves techniques such as DNA amplification, genetic circuit construction, molecular cloning, and spectrophotometric and bioinformatics analyses. My principal area of research is assessing and augmenting human health and performance through microbiome analysis and synthetic biology of probiotic microbes. I am currently the technical lead for projects to determine how the gut microbiome of deployed personnel affects human health and performance, the Vice-Chair of the Tri-Service Microbiome Consortium, and the technical lead for the AFRL 'Grand Challenge' project involving the design and generation of 'smart probiotics' that can maintain optimum human performance. *Photo courtesy of the U.S. Air Force Research Laboratory.*